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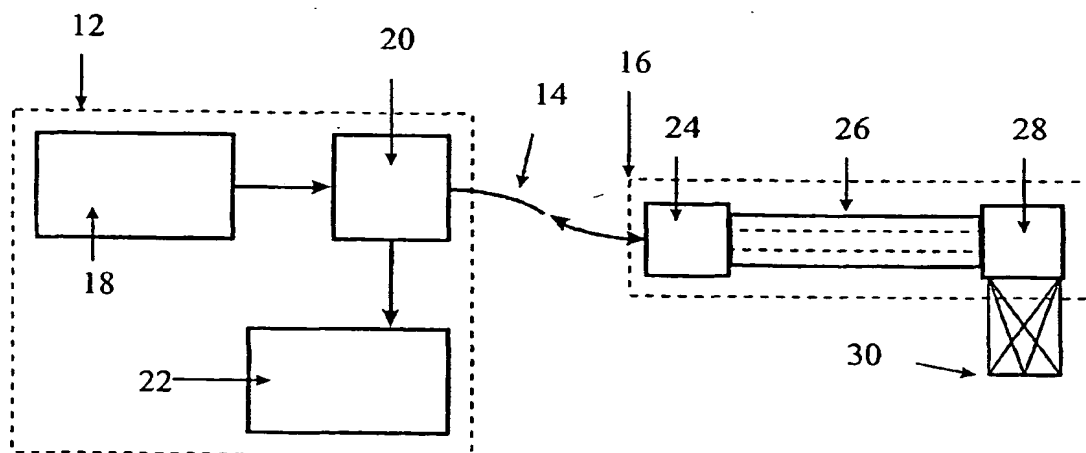
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1/07, 1/018, 5/00, G02B 21/00, 23/24
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- (81) **Designated States (national):** AE, AG, AL, AM, AT (util-  
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LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,  
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*[Continued on next page]*

- (S4) Title:** SPECTRALLY ENCODED MINIATURE ENDOSCOPIC IMAGING PROBE



- (57) Abstract:** A spectrally encoded endoscopic probe having high resolution and small diameter comprising at least one flexible optical fiber; an energy source; a grating through which said energy is transmitted such that the energy spectrum is dispersed; a lens for focusing the dispersed energy spectrum onto a sample such that the impingement spot for each wavelength is a separate position on the sample, the wavelength spectrum defining a wavelength encoded axis; means for mechanically scanning the sample with focused energy in a direction perpendicular to the wavelength encoded axis; a means for receiving energy reflected from the sample; and, a means for detecting the received reflected energy. The probe grating and lens delivers a beam of multispectral light having spectral components extending in one dimension across a target region and which is moved to scan in another direction. The reflected spectrum is measured to provide two dimensional imaging of the region.



patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/US 01/49704

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61B1/313 A61B1/07 A61B1/018 A61B5/00 G02B21/00  
G02B23/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B G02B F21V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 44089 A (GEN HOSPITAL CORP ; TEARNEY GUILLERMO J (US); BOUMA BRETT E (US); W) 2 September 1999 (1999-09-02) cited in the application the whole document	1-6,8, 10-15, 17-26, 32,60-65 35-47, 66,67
Y		
X	US 5 785 651 A (BAKER PHILLIP C ET AL) 28 July 1998 (1998-07-28)  column 6, line 27 -column 7, line 3 column 7, line 39 -column 7, line 59 column 10, line 1 -column 10, line 30; claims 5-8,12; figures 3,5,9,10  -/--	1-9,11, 12, 14-17, 19-21, 32,33, 60-63,65

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"8" document member of the same patent family

Date of the actual completion of the international search

29 August 2002

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10.12.02

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## INTERNATIONAL SEARCH REPORT

Int onal Application No

PCT/US 01/49704

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 585 349 A (GROSS DANIEL ET AL) 29 April 1986 (1986-04-29)  column 6, line 28 -column 7, line 7; claims 4-14; figure 3 ---	1-9,11, 12, 14-17, 19-21, 32, 60-63,65
Y	US 5 817 144 A (GREGORY KENTON W) 6 October 1998 (1998-10-06)	35-47, 66,67
A	column 4, line 66 -column 5, line 45 column 6, line 61 -column 7, line 35; claim 12; figures 1-3 ---	34,59
Y	DE 195 42 955 A (POLYDIAGNOST VERTRIEBS & SERVI ;SCHWIND GMBH & CO KG HERBERT (DE)) 22 May 1997 (1997-05-22)	35-41, 44-47, 66,67
A	column 1, line 58 -column 3, line 61 -----	34,59

# INTERNATIONAL SEARCH REPORT

national application No.  
PCT/US 01/49704

## Box I Observations where certain claims were found unsearchable (Continuation of item 4 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 27-31  
because they relate to subject matter not required to be searched by this Authority, namely:  
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-26, 32-47, 59-67

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-26,32-47,59-67

A spectrally encoded endoscopic probe.

2. Claims: 48-54

A multifiber catheter having at least one imaging and one therapeutic light energy delivering fiber.

3. Claim : 55

A multifiber catheter having a plurality of spaced apart apertures on the surface of an elongated hollow cylindrical body.

4. Claims: 56-58

A multifiber catheter having an array of optical fibers and lenses associated with the distal end of each fiber.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/49704

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9944089	A	02-09-1999	AU 2882399 A	15-09-1999
			EP 1057063 A1	06-12-2000
			JP 2002505434 T	19-02-2002
			WO 9944089 A1	02-09-1999
			US 6341036 B1	22-01-2002
			US 2002122246 A1	05-09-2002
-----				
US 5785651	A	28-07-1998	AU 5860296 A	30-12-1996
			EP 0830565 A1	25-03-1998
			WO 9641123 A1	19-12-1996
-----				
US 4585349	A	29-04-1986	CH 663466 A5	15-12-1987
			EP 0142464 A1	22-05-1985
			JP 60073405 A	25-04-1985
-----				
US 5817144	A	06-10-1998	US 5571151 A	05-11-1996
			US 5836940 A	17-11-1998
-----				
DE 19542955	A	22-05-1997	DE 19542955 A1	22-05-1997
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